SEASONS -1

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_\_\_\_\_\_



The diagram to the right shows the altitude

of the sun at solar noon on March 21, as seen

by an observer at 42o N latitude.

1. \_\_\_\_\_ Compared to the altitude of the sun observed at solar noon on Mar 21, the altitude of the sun observed at solar noon on June 21 will be

 (1) 15o higher in the sky (3) 42o higher in the sky

 (2) 23.5o higher in the sky (4) 48o higher in the sky

2. \_\_\_\_\_ Which diagram below best shows the sun’s apparent path, as seen by an observer on July 21 in New York State?

Base your answers to questions 3 through 5 on the diagram below, which shows the amount of insolation during one year at four different latitudes on Earth’s surface.



3. \_\_\_\_\_ This graph shows that insolation varies with

(1) latitude and time of day (3) longitude and time of day

(2) latitude and time of year (4) longitude and time of year

4. \_\_\_\_\_ Why is less insolation received at the equator in June than March or September?

 (1) The daylight period is longest at the equator in June.

(2) Wind blows insolation away from the equator in June.

(3) The sun’s vertical rays are north of the equator in June.

(4) Thick clouds block the sun’s vertical rays at the equator in June.

5. \_\_\_\_\_ Why is insolation 0 cal/cm2/min from October through February at 90o N?

 (1) Snowfields reflect sunlight during that time.

 (2) Dust in the atmosphere blocks sunlight during that time.

 (3) The sun is continuously below the horizon during that time.

 (4) Intense cold prevents insolation from being absorbed during that time.

The diagram below shows Earth on a particular day in its orbit around the sun. The dashed line represents Earth’s axis.



6. \_\_\_\_\_ Which date is represented by the diagram?

 (1) March 21 (3) September 23

 (2) June 21 (4) December 21

7. \_\_\_\_\_ If Earth’s axis were tilted *less* than 23.5°, which seasonal average temperature change would occur in New York State?

(1) Spring and fall would be cooler.

(2) Spring and fall would be warmer.

(3) Winter would be cooler.

(4) Summer would be cooler.



8. \_\_\_\_\_ At which latitude were these apparent sun paths most likely observed?

 (1) 0o (3) 43o N

 (2) 23.5o N (4) 66.5o N



9. \_\_\_\_\_ In which diagram is the observer experiencing the greatest intensity of insolation?



10. \_\_\_\_\_ Which graph best represents the average monthly temperatures for one year at a location in the Southern Hemisphere?

Use the map below to answer questions 11 through 13.



11. \_\_\_\_\_ At which location would an observer **not** see Polaris in the night sky at any time during the year?

 (1) A (3) C

 (2) B (4) D

12. \_\_\_\_\_ Which location receives 12 hours of daylight and 12 hours of darkness on June 21?

 (1) A (3) C

 (2) B (4) D

13. \_\_\_\_\_ At which location on December 21 is the sun directly overhead at solar noon?

 (1) A (3) C

 (2) B (4) D

Use the map below to answer questions 14 through 16.



14. \_\_\_\_\_ Which diagram below shows the position of Earth relative to the sun’s rays on this day?



15. \_\_\_\_\_ Approximately how many hours of daylight would occur at position A on this day?

 (1) 6 (3) 12

 (2) 9 (4) 15

16. \_\_\_\_\_ On this day, the duration of daylight from the equator to the Arctic Circle

 (1) decreases, only (3) decreases, then increases

 (2) increases, only (4) increases, then decreases

Base your answers to questions 17 and 18 on the diagram below, which represents the sky above an observer in Elmira, New York. Angular distances above the horizon are indicated. The Sun’s apparent path for December 21 is shown.

17. On March 21, the altitude of the noon Sun in Elmira is 48o. On the diagram to the right, draw the Sun’s apparent path for March 21, as it would appear to the observer. Be sure your path begins and ends at the correct position on the horizon and indicates the correct altitude of the noon Sun.

18.\_\_\_\_\_\_\_\_\_\_On what date of the year does the maximum duration of insolation usually occur at Elmira?



19. The sky model diagram to the right shows the apparent path of the Sun on March 21 for an observer in Buffalo, New York. Draw a line to represent the apparent path of the sun from sunrise to sunset at Buffalo on June 21. Be sure your path indicates the correct altitude of the noon Sun and begins and ends at the correct positions on the horizon.

20. On the same sky model diagram to the right, place an asterisk (\*) at the apparent position of the *North Star* as seen from Buffalo.

Base your answers to questions 21 and 22 on the diagram below. The diagram shows a model of Earth’s orbit around the Sun. Two motions of Earth are indicated. Distances to the Sun are given for two positions of Earth in its orbit.

21. On the diagram to the right, place an X on Earth’s orbit to indicated Earth’s position on May 21.

22. Explain why New York State experiences summer when Earth is at its greatest distance from the Sun.

Base your answers to questions 23 through 25 on the information below and your knowledge of Earth science.

 Accurate observations of the Sun were made by a New York State observer. This person observed the time of sunrise and the position of sunrise along the eastern horizon for each day during the month of May.

23. Describe how the ***time*** of sunrise changed for the observer each day during the month of May.

24. Describe how the ***position*** of sunrise changed for the observer each day during the month of May.

25. State the actual Earth motion that causes the Sun to appear to rise each day.

26. Base on the data table to the right, state the relationship between latitude and the duration of daylight.

27. The data were recorded for the first day of a certain season in the Northern Hemisphere. State the name of this season.